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Interborough Rapid
Transit Company

How a twenty million dollar
railroad was built in mid-air

New York

[1917]

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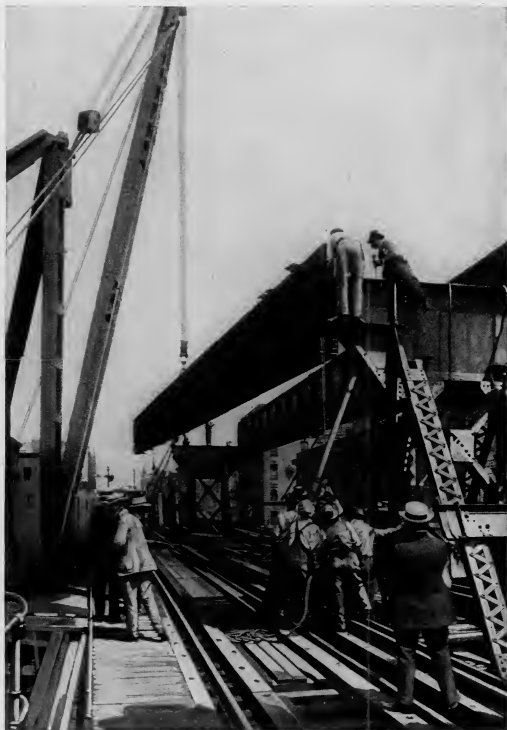
**INTENTIONAL
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How a Twenty Million Dollar Railroad was Built in Mid-Air



Third Tracking the New York "L"





How A
Twenty Million Dollar
Railroad Was Built
In Mid-Air

*Third Tracking
the "L"*

Interborough Rapid Transit Company
165 Broadway • New York



How A
Twenty Million Dollar
Railroad Was Built
In Mid-Air

*Third Tracking
the "L"*

Interborough Rapid Transit Company
165 Broadway • New York

How the Third Track Increased the Elevated's Service

January 17, 1917, was the first anniversary of the opening of express service on the third tracks of the Elevated.

How the new facilities have made it possible for the Company to render a greatly increased service to the public is shown by the gain in passengers carried:

<i>Year</i>	<i>Passengers Carried</i>
1910	294,000,000
1911	301,000,000
1912	304,000,000
1913	309,000,000
1914	311,000,000
1915	302,000,000
1916	339,734,536

Whereas Elevated traffic had been practically stationary for many years, the first year's gain after the opening of the third track was thirteen per cent.

How A Twenty Million Dollar Railroad Was Built in Mid-Air

I

*What the "L"
Means to
New York*

ONE miracle, in the endless list of miracles in industrial achievement, never loses its deep interest for New York. A new way of bringing homes closer to business—of making the trip quicker between the two—is of more vital consequence to the city than the most imposing engineering triumph in a distant land.

The building of a third-track in mid-air to carry express trains on the Elevated railways, without the interruption of traffic for a single hour, nor the killing of a single passenger, was for New York a more important engineering feat than the building of the Panama Canal.

The first anniversary of the new service was celebrated on January 17, 1917.

HOW A TWENTY MILLION DOLLAR
RAILROAD WAS BUILT IN MID-AIR

Through the use of the third tracks, twice the number of expresses now leave City Hall station during the rush hours between 5 and 7 p. m.

On the Second and Sixth Avenue Lines, formerly without any express service, passengers now can avail themselves of forty-nine trains between 5 and 7 o'clock.

On the Third Avenue Line, the number of uptown expresses at night has increased from 40 to 55, while on the Ninth Avenue Line four new trains have been added to the previous 23.

The total number of express trains to serve the public between 5 and 7 p. m. is 131 as against 67 with the old facilities.

* * *

This is but one instance of the practical value of the new service for the New Yorker. Yet this achievement, as great in its way as the building of the Grand Central Terminal or the Catskill aqueduct, was so well done and has come into the life of the city so quietly that not many people realize what has happened. Few reading their papers on the way down town in the morning realized the miracle just outside the car-windows.

For twenty-one months this aerial work of building the new lines and rebuilding the old went on.

THIRD TRACKING
THE "L"

With the exception of a two weeks' suspension of expresses on the 9th Avenue line south of 72nd Street during the construction of the new station "humps," trains used the tracks as usual. Nor did the building going on overhead force the closing of streets to traffic, and there was little congestion because of it.

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*Passenger trains ran as usual while
the construction work went on*



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II

*The Magnitude
of the Builders'
Task*

WHEN the Interborough Company, as part of the new Dual System, set out to increase the capacity of the Elevated roads it faced a tremendous problem. The engineering difficulties were such as no ordinary contractor could be found to undertake, nor could one only be entrusted with full responsibility.

Many times before, plans had been prepared for the improvement, only to be abandoned because of the difficulties.

The best-known contractors in the city were invited to consider the new project. From them three of the ablest firms were entrusted with the work: Terry & Tench, Snare and Triest, and T. A. Gillespie Co. They pooled their resources and skill for the novel task.

They were to be paid, not on a flat contract price that might involve saving at the expense of safety, but on a basis of cost, plus a fifteen per cent. margin of profit and fee for services and the use of equipment of the three firms. Thus the best of material and the most competent of engineers were assured.

* * *

The third tracking was completed at a cost in excess of \$20,000,000. The contract was let February 13, 1914, the work began thirty days later, and finished in twenty-one months, or by January 1, 1916. On January 17, 1916, the new express service was begun.

III

*How the Public's
Safety Was
Assured*

THE prime problem of the contractors was to conserve public safety. They had been relieved of responsibility for the cost of materials that they might devote themselves wholly to the engineering task.

At any time the slightest mistake in plans or defect in structure might have put in jeopardy the lives of hundreds, or have sent trainloads of people into the street below.

Not until the last rivet had been fastened and the last temporary support withdrawn was this risk wholly removed.

The second problem was to do the work with the least interference with either "L" traffic or street traffic. The whole job had to be done high aloft in congested and narrow spaces, often not more than twenty feet wide, and yet keep the street below open for vehicles and surface cars.

Two major considerations determined the company's policy toward the contract—prompt completion of the work and the maintenance of traffic. Both were essential.

It was important to avoid piece-meal construction through a series of sub-contracts, which would involve such delays as have put off completion of the new

*Chatham Square—the hardest traffic knot
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subway lines. Instead the whole work was going at once and no vital link was lacking when it came time to open the new tracks.

No contractor could have been found willing to submit, on a flat contract basis, to constant interruption of construction for traffic. To insure the full operation of tracks, and at the same time see to their safety, it was necessary for the company to retain complete control. This the cost plus profit basis of contract made possible.

* * *

The longest single interruption to traffic was twenty minutes. This was in the construction of the Park Row line near Chambers Street. It took just that time to unload, hoist, adjust in place and rivet a giant girder, 70 feet long, ten feet high, weighing 30 tons.

But in planning that twenty-minute operation, in adjusting to a hair the time and skill necessary, forty engineers spent nearly three days. Every second of those twenty minutes was as carefully calculated on a schedule as beats of the mainspring of a watch.

An everyday feat—to hoist and put a giant girder in place before time for the next train



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IV

*What Went Into
the Railroad
in the Air*

THESE were the things done in the building of the third track improvement:

1. Fifteen miles of trestle and track were built.
2. Nine miles of old lines were rebuilt.
3. A Harlem River bridge was replaced with a new one.
4. Supports and foundations made way for others designed to care for the traffic of 1950 rather than that of 1880.
5. Twenty-nine stations were remodeled and enlarged.
6. At seventeen stations "double deck" express platforms were built.

And all was done without taking a train off the regular schedules.

* * *

In laying the track more than 6,500 tons of rails, 12,000,000 feet of lumber for ties, and 500 tons of bolts and spikes were used.

From Chatham Square to City Hall two new tracks were superposed on the old local tracks. Pillars and structure for the double burden, therefore, had to be twice as strong. While the new columns were set in concrete foundations, traffic was borne on a temporary wooden structure, heavily braced to withstand the weight and vibration.

In many places, especially along the Bowery, it was necessary to go fifteen feet below the surface to find proper foundations for the columns. These bases were ten feet square at the bottom, tapering to five feet square at the pavement line.

* * *

HOW A TWENTY MILLION DOLLAR
RAILROAD WAS BUILT IN MID-AIR

*At many stations passengers used temporary
platforms while construction went on*



THIRD TRACKING
THE "L"

V

*Solving the Puzzle
at City Hall
Park*

THE most difficult feat of construction was at City Hall. Here street congestion, owing to the entrance to Brooklyn Bridge, is greater than anywhere else in Manhattan. Elevated trains during rush hours run forty seconds apart. Some 900 trains a day, carrying 120,000 passengers, leave the terminal, while at Chatham Square, where South Ferry trains cross the tracks from City Hall, 1,842 trains pass the station every twenty-four hours.

With this traffic going on, the old double-track Park Row line was increased to four tracks on two levels. At City Hall a "double-deck" station with six platforms replaced the old terminal with its three platforms.

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At Chatham Square engineers had to separate two streams of trains, one going to the bridge, and the other on to South Ferry. Without interrupting the flow they eliminated the grade crossing and replaced it with a double level of tracks. A new station was built serving both levels with no less than eight tracks.

Thus a Second Avenue train for City Hall now takes the upper level tracks at Chatham Square after passing under South Ferry trains on the Third Avenue line.

*Where the traffic streams from South Ferry
and City Hall met at Chatham Square*



VI

*Changing Bridges
in Half a Day*

NOR was there long delay to trains in putting a new bridge in place of the old Second Avenue span across the Harlem River. The method by which these bridges were picked up and moved about, as though they were toys, was in itself an engineering marvel.

The three new spans of the new bridge, each carrying a double level of tracks as against the old single level bridge, were assembled a short distance up-stream. Each was placed on barges and supported by scaffolding that, lifted by the high tide, attained exactly the proper elevation.

Beneath the old structure, other barges were anchored. These barges, lifted by the tide, pressing against the girders above, lifted them from their position and the old bridge floated away down stream. At the same time the barges above floated

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*The tide harnessed
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down and were anchored. But instead of waiting for the tide to ebb, as is done in other bridge moving, novel sand boxes under the shoring had been provided. Thus when the structure was in place, valves were opened and the sand flowed out, the bridge settling in position hours before the tide turned. On the north and south spans, only five hours were necessary to complete the change, while the large centre span, despite a snow storm which upset all tide calculations, was placed in less than twelve hours.

At many stations on the Elevated road it was necessary to raise the tracks several feet so that mezzanine platforms connecting both sides could be

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*The old bridge—
making way for
the expanding
needs of the City*



installed. Thus the structure at and near 125th Street and Second Avenue was lifted into the air a maximum of about seven feet, for a distance of more than a quarter of a mile.

Around the pillars, on the sections to be raised, engineers constructed temporary wooden towers. Powerful jacks bearing on the cross-girders would then lift the structure a few inches for a distance of about 200 feet. Then another section would be raised. After the complete stretch had been lifted the whole progress would be repeated, a few inches at a time until the new level was reached. During even this operation trains continued to use the structure.

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VII

*Why the "Humps"
Were Built*

IT is worth while noting that the "humps" or undulations familiar in the new express tracks, were first proposed when the Elevated was built in 1872. Their efficiency at the stations in retarding incoming trains and accelerating departing trains even then was recognized. They were overruled because of the additional stairs for passengers to climb. Now they have been resorted to because of the gain in train speed and because the narrowness of many streets would not permit of "island" platforms.

The construction of the "humps" also involved the removal of pillars and cross-girders and the substitution of heavier members. It meant the hoisting of massive steel beams between trains passing every minute. Temporary tracks for the work trains had to be laid as well.

Thus was the latest extension of New York's rapid transit facilities worked out. Express stations on the new lines were located as follows:

<i>Ninth Avenue Line:</i>	<i>Third Avenue Line:</i>	<i>Second Avenue Line:</i>
Cortlandt	City Hall	City Hall
Warren	Chatham Square	Chatham Square
Desbrosses	Canal	14th
Christopher	Grand	42nd
14th	Houston	86th
34th	9th	and
66th	23rd	125th
116th	42nd	Streets
125th	106th	
145th	125th	
and	133rd	
155th	138th	
Streets	143rd	
	and	
	149th	
	Streets	

VIII

*Where Credit
is Due*

DONE in the heart of a great city, without loss of life of a single passenger, without the tying up of traffic, without delay or needless waste—that is the record of the building of the Elevated express tracks.

The credit is to no one man. It is to the contractors, for their efficiency and painstaking care, to Interborough officials and men co-operating in so serious an undertaking and to the city officials and the public generally, for the wise and far-sighted interest shown in this miracle of industry.

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